BLUEPRINT FOR SUCCESS

EVALUATION RECOGNITION

GRADE LEVEL
K–12

Use this guide to plan a successful energy unit in your classroom that meets your standards of learning.

NEED 2009-2010
Putting Energy into Education

NEED Project PO Box 10101 Manassas, VA 20108 1-800-875-5029 www.NEED.org

Teacher Advisory Board

Teacher Advisory Board Vision Statement

NEED Mission Statement

The mission of the NEED Project is to promote an energy conscious and educated society by creating effective networks of students, educators, business, government and community leaders to design and deliver objective, multi-sided energy education programs.

In support of NEED, the national Teacher Advisory Board (TAB) is dedicated to developing and promoting standards-based energy curriculum and training.

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AN INTRODUCTION TO THE BLUEPRINT

Energy is the perfect theme for a multi-disciplinary unit. NEED curriculum materials are designed to develop students' critical thinking and leadership skills in science, math, language arts, technology, music, art, and social studies, as well as enhance their general knowledge of energy. If you are team teaching, NEED activities are a good way to encourage students and teachers to work together on a common theme. All of the curriculum materials include a list of the subject areas appropriate for the particular activities included.

This blueprint will help you build an age-appropriate, hands-on energy unit. Included are brief descriptions of all of NEED's materials, along with grade level and the approximate time needed to complete each unit. Many NEED materials are appropriate for a broad range of grade levels with suggestions included for each grade level. An order form can be found in the NEED Catalog so you can order the materials you need. NEED curriculum can also be found online at www.need.org. For many units, class sets of student materials are available, as well as hands-on kits. All NEED materials are correlated to the National Science Education Content Standards and to many state standards.

In many areas, NEED members also have the opportunity to attend training workshops and conferences. For more information on student and teacher training programs and professional development, please call NEED Headquarters at 1-800-875-5029.

Participating in NEED's Youth Awards Program for Energy Achievement is a wonderful way for students to document and be recognized for their work. Have the students keep a scrapbook of their activities as they progress through the energy unit. More information is in the **Youth Awards Guide** in the **Projects and Activities** booklet included in your NEED Membership Packet.

ENERGY DATA USED IN NEED MATERIALS

The statistical energy data for 2008 largely comes from the Energy Information Administration (EIA) April 2009 Monthly Energy Review (MER). The first preliminary statistics for 2008 were released in the March 2009 MER, and were revised for the April edition; these numbers may be further revised as the EIA continues to analyze energy production and consumption for 2008. In addition to the MER, electricity statistics were retrieved from the EIA Electric Power Monthly, May 2009 edition. Final 2008 data is published in June in the EIA Annual Energy Report.

For more information on energy statistics you may visit the EIA at ww.eia.doe.gov.

The Steps in a NEED Program

In order for students to receive a well rounded energy education, NEED has developed eight steps to help teachers plan a comprehensive energy unit. Teachers may order a **Basic NEED Unit** appropriate for their grade level. This unit (as shown on page 5) includes materials from each step giving teachers the resources they need to teach their students about energy.

On page 7 is a matrix of all available NEED materials categorized by NEED's steps to energy education and grade level. Educators may use this list and the curriculum descriptions found in this booklet to customize their energy unit.

STEP ONE: SCIENCE OF ENERGY

Students need to learn the science of energy before they can learn about the sources of energy, electric power production, and energy conservation and efficiency. Students learn the forms of energy (heat, light, motion, sound, electricity) and how energy is transformed from one form into other forms. Secondary students can extend their knowledge to thermodynamics. Several hands-on kits are available for sale or rental, such as the Primary, Upper Elementary/Intermediate, and Secondary **Science of Energy, EnergyWorks**, and **ElectroWorks**.

STEP TWO: SOURCES OF ENERGY

These materials give students an understanding of the energy sources used today—their formation, exploration, production, distribution, consumption, and economic and environmental trade-offs. **NEED Energy Infobooks** provide comprehensive information on the major energy sources at four reading levels. Several units about specific energy sources are available.

STEP THREE: ELECTRICITY & MAGNETISM

These materials provide students with information and hands-on explorations of the scientific concepts of electricity and magnetism, electricity generation, transmission, and efficient use of electricity. **NEED Energy Infobooks** provide background information on electricity. An **Exploring Magnets Kit** and an **ElectroWorks Kit** are available, as well as solar, wind, and hydropower kits that include hands-on activities on electromagnetism. **Current Energy Affair** provides students with language arts activities about electricity.

STEP FOUR: TRANSPORTATION FUELS

Several modules are available that teach students about the transportation sector of the economy, current transportation fuels, and fuels of the future.

STEP FIVE: ENERGY EFFICIENCY AND CONSERVATION

Students learn how energy is used, about efficient technologies, and ways to conserve energy at home and at school. **Energy Management** curriculum materials and **Energy Management Kits** are available for all grade levels. Residential energy management lessons are also available.

STEP SIX: SYNTHESIS, REINFORCEMENT, EXTENSION

There are many hands-on activities available to reinforce, synthesize, and extend the information the students have learned. Also available are activities for students to teach others what they have learned.

STEP SEVEN: EVALUATION

Most NEED activities include evaluation strategies. NEED's Question Bank on the NEED website at www.need.org/QBank.php gives teachers the ability to customize evaluation tools for their energy units.

The **Energy Polls** are pre/post evaluation tools at four reading levels that are included in this booklet. These polls are also online and teachers may register their classes to take the polls online.

STEP EIGHT: RECOGNITION

The **Youth Awards Guide** (in **Projects and Activities**) gives you all the information you need to document your energy activities in a scrapbook and to participate in the Youth Awards Program for Energy Achievement. The deadline to submit projects to NEED is is April 15, 2010.

How to Get Started

- ☐ The diagram below shows you the suggested materials you will need to implement a basic NEED unit according to your grade level.
- ☐ Additional activities for each grade level and step are listed on page 7 and are described in this booklet. Mark the activities you think would meet objectives for your class.
- ☐ Fill out the top of the Order Form from your NEED Resource Catalog or your workshop presenter. Either mark the basic unit for your grade level or select the guides you wish to use in the classroom.
- ☐ Mail or fax your Order Form to NEED Headquarters at 1-800-847-1820. Be sure to indicate on the form the date you want to receive your materials.
- ☐ If you have any questions after reviewing the materials, call your workshop presenter or NEED Headquarters at 1-800-875-5029. We're here to help you before and during your energy unit.
- ☐ All curriculum guides are available to download free of charge at www.need.org.

Note: The booklets in italics are not available in print; they are available online at www.need.org to download.

Basic NEED Units	Basic Primary Unit (K-2)	Basic Elementary Unit (3-5)	Basic Intermediate Unit (6-8)	Basic Secondary Unit (9-12)
INTRODUCTORY ACTIVITIES	◄ Energy Games and Icebreakers ►			
STEP ONE: Science of Energy	Primary Science of Energy	Science of Energy EnergyWorks	Science of Energy	Secondary Science of Energy
STEP TWO: Sources of Energy	◄ Energy Games and Icebreakers ►			
	Primary Energy Stories and More	Energy in the Balance	Debate Game	Energy Enigma
STEP THREE: Electricity & Magnetism	Exploring Magnets	ElectroWorks	ElectroWorks	*Mission Possible*
STEP FOUR: Transportation	Primary Energy Stories and More	What Car Will You Drive?	The Future is Today	The Future is Today
STEP FIVE: Conservation & Efficiency	Building Buddies Saving Energy Flipbook	Monitoring and Mentoring	Monitoring and Mentoring	Learning and Conserving
STEP SIX: Synthesis & Reinforcement	Primary Carnival	Energy Carnival	Energy Carnival	Energy Carnival
		◄ Energy Conservation Contract ►		
STEP SEVEN: Evaluation			◄ Energy Jeopardy ►	
	◄ Energy Polls (Blueprint for Success) ►			
STEP EIGHT: Recognition	◄ *Question Bank* ►			
	◄ Youth Awards Program (Projects and Activites) ►			

NEED CURRICULUM

Rather than ordering a Basic Unit, teachers may choose to order separate curriculum pieces. On the following page is a chart designed to assist teachers in planning an individualized energy unit. All NEED materials are listed by grade level and by where the majority of information in the material fits into NEED's Energy Education Steps. Detailed descriptions of the curriculum can be found starting on page 8.

It is important to note that many curriculum pieces overlap steps. **NEED Energy Infobooks** are the foundational piece of any energy education unit. Written at four different levels - primary, elementary, intermediate, and secondary, each Infobook has in-depth information on the major energy sources. Topics also covered in the **Infobooks** include Electricity (Step Three) and Energy Efficiency and Conservation (Step Five). Individual books on specific sources used to generate electricity often include background information on electricity and magnetism. This is the case in NEED's curriculum series on solar energy, hydropower, wind energy, hydrogen, and nuclear energy.

Whether ordering a **Basic NEED Unit** or choosing individual curriculum pieces, teachers should thoroughly review all materials and plan their units according to the needs of their students and their classroom timing and sequencing.

In addition to printed materials, NEED also offers many different hands-on kits. For more information on available kits please refer to the **Resource Catalog,** or visit www.need.org. All NEED curriculum guides are available online at www.need.org.

NEED CURRICULUM MATRIX STEPS 1-8

	PRIMARY (K-2)	ELEMENTARY (3-5)	INTERMEDIATE (6-8)	SECONDARY (9-12)
INTRODUCTORY ACTIVITIES	Energy Games and Icebreakers	Energy Games and Icebreakers	Energy Games and Icebreakers	Energy Games and Icebreakers
STEP ONE: Science of Energy	Primary Science of Energy	EnergyWorks Energy Flows Science of Energy	Science of Energy Energy Flows EnergyWorks	Science of Energy Energy Flows Thermodynamics
STEP TWO: Sources of Energy	Primary Energy Flipbook Primary Flipbook Activities Primary Energy Stories and More The Sun and its Energy Wind is Energy Water and Energy	Elementary Energy Infobook Elementary Infobook Activities Energy Source Expo Energy in the Balance Energy from the Sun Energy on Public Lands Great Energy Rock Performances LNG Primary Energy Stories and More Wonders of Wind Wonders of Water U.S. Energy Geography	Intermediate Energy Infobook Intermediate Infobook Activities Energy Enigma Energy Source Expo Energy of Moving Water Energy from Uranium Energy from the Wind Energy on Public Lands Exploring Solar Energy Fossil Fuels to Products Great Energy Debate Great Energy Rock Performances LNG Marine Energy U.S. Energy Geography Ocean Energy	Secondary Energy Infobook Secondary Infobook Activities Energy Enigma Energy Source Expo Exploring Hydroelectricity Exploring Nuclear Energy Exploring Wind Energy Fossil Fuels to Products Great Energy Debate Great Energy Rock Performances LNG Marine Energy Photovoltaics U.S. Energy Geography
STEP THREE: Electricity & Magnetism	Exploring Magnets	Exploring Magnets ElectroWorks	ElectroWorks Current Energy Affair Mission Possible	Mission Possible Current Energy Affair
STEP FOUR: Transportation	Primary Energy Stories and More	What Car Will you Drive? Biodiesel Ethanol Transportation Fuels Expo Transportation Rock Performances	Biodiesel Ethanol H2 Educate The Future is Today Transportation Fuels Debate Transportation Fuels Enigma Transportation Fuels Expo Transportation Rock Performances What Car Will you Drive?	Biodiesel Ethanol H2 Educate The Future is Today Transportation Fuels Debate Transportation Fuels Enigma Transportation Fuels Expo Transportation Rock Performances
STEP FIVE: Conservation & Efficiency	Building Buddies Climate Change Flipbook Saving Energy Flipbook Today in Energy Trash Flipbook	Building Buddies Energy House Energy Conservation Contract Monitoring and Mentoring Saving Energy Expo Talking Trash This Week in Energy Conservation Today in Energy Saving Energy at Home and School	Energy Conservation Contract Energy House Monitoring and Mentoring Museum of Solid Waste and Energy Saving Energy Expo This Week in Energy Conservation Understanding Climate Change Saving Energy at Home and School	Energy Conservation Contract Exploring Climate Change Learning and Conserving Museum of Solid Waste and Energy Saving Energy Expo School Energy Survey This Week in Energy Conservation
STEP SIX: Synthesis & Reinforcement	Primary Carnival Energy Fair NEED Songbook	Energy Around the World Energy Carnival Energy Fair Energy House Energy in the Balance Energy Jeopardy Energy Math Challenge Energy on Stage Energy Rock Performances Exploring Energy Global Trading Game Greek Mythology and Energy Mystery World Tour NEED Songbook This Mine of Mine Yesterday in Energy	Energy Analysis Energy Around the World Energy Carnival Energy House Energy in the Balance Energy Jeopardy Energy Math Challenge Energy on Stage Energy Rock Performances Exploring Energy Global Trading Game Greek Mythology and Energy Mystery World Tour NEED Songbook This Mine of Mine Yesterday in Energy	Energy Analysis Energy Around the World Energy Carnival Energy Jeopardy Energy Math Challenge Energy on Stage Energy Rock Performances Global Trading Game NEED Songbook Yesterday in Energy
STEP SEVEN: Evaluation	Energy Polls (Blueprint for Success) Question Bank	Energy Polls (Blueprint for Success) Question Bank	Energy Polls (Blueprint for Success) Question Bank	Energy Polls (Blueprint for Success) Question Bank
STEP EIGHT: Recognition	Youth Awards Program (Projects and Activities)	Youth Awards Program (Projects and Activities)	Youth Awards Program (Projects and Activities)	Youth Awards Program (Projects and Activities)

Step One: Science of Energy

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

SCIENCE OF ENERGY

Time: 3–6 hours **Grade Levels: 5–8 and 9–12** **Subjects: S, M, LA**

Science of Energy provides comprehensive instruction in energy transformations through a series of hands-on experiments. Students learn about the different forms of energy and how they are converted to other forms. Included are Teacher Demonstrations, and Student Guides for six stations. Each station explores a different aspect of energy transformations—such as light to electricity, light to heat, motion to sound, motion to heat, etc.

PRIMARY SCIENCE OF ENERGY

Time: 12–18 hours **Grade Level: 1-3** **Subjects: S, M, LA**

Primary Science of Energy introduces primary students to the basic forms of energy—motion, heat, light, and sound—with simple explorations that emphasize observation, comparison and contrast, and using simple tools and measurements. The Teacher Guide includes instructions for each activity. The Student Guide contains worksheets for each exploration and how to measure with thermometers, balances, rulers, beakers, and graduated cylinders. The **Primary Science of Energy Kit** contains a class set of Student Guides and the materials needed for the Teacher Demos and Student Explorations.

ENERGYWORKS

Time: 12–18 hours **Grade Level: 4–8** **Subjects: S, M, LA**

EnergyWorks introduces elementary students to the basic scientific concepts of energy and the tasks it performs—heat, light, motion, sound, growth, and powering technology. The Teacher Guide includes instructions for each unit, plus Teacher Demonstrations and Transparency Masters. The Student Guide contains backgrounders and key words on each component and worksheets for each exploration. The Student Guide also shows students how to read thermometers using both Fahrenheit and Celsius scales, how to use spring scales to measure force, and how to use protractors to measure angles of incidence and reflection.

ENERGY FLOWS

Time: 45 minutes **Grade Level: 5–12** **Subjects: S, SS, M, LA**

Energy Flows introduces students to forms of energy and energy transformations as a stand-alone hands-on activity or as an introductory activity to the Elementary and Secondary Science of Energy Kits.

THERMODYNAMICS

Time: 6 hours **Grade Level: 9–12** **Subjects: S, M, LA, T**

A guide to hands-on experiments that explore concepts of thermodynamics, including molecular structure, conduction, convection, radiation, specific heat, heat of fusion, and heat of vaporization. The Teacher Guide includes teacher demonstrations, an activity for students to calibrate blank thermometers, a list of laboratory materials needed, and a Unit Exam.

For information about NEED's hands-on kits, the NEED catalog has descriptions of equipment, cost, and ordering details. You can obtain a catalog by calling 1-800-875-5029 or downloading a copy from www.need.org.

Step Two: Sources of Energy

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

ENERGY INFOBOOKS *IN RESOURCE PACKET*

Time: Varies **Grade Level: K–12** **Subjects: S, SS, M, LA**

NEED's **Energy Infobooks** provide resource information on energy, the sources of energy, electricity, consumption, and environmental effects. Available on four reading levels—primary, elementary, intermediate, and secondary. Many NEED activities are based on the information in these booklets. The primary level is in a flipbook design. Class sets of Infobooks are available at elementary, intermediate, and secondary levels. Individual infosheets are online.

ENERGY INFOBOOK ACTIVITIES

Time: Varies **Grade Level: K–12** **Subjects: S, SS, M, LA**

NEED's **Energy Infobook Activities** are companion student workbooks to the Infobooks that include graphs, puzzles, short answer, and fill-in-the-blank activities to reinforce the information in the infobooks. A Teacher Guide and answer key are included. Available at four reading levels—primary, elementary, intermediate, and secondary. Booklets are available on line only.

ENERGY ENIGMA

Time: 2.5 hours **Grade Level: 7–12** **Subjects: S, SS, LA**

Students organized in groups use critical thinking skills to unlock the energy source mystery using clues of increasing difficulty.

ENERGY IN THE BALANCE

Time: 3–5 hours **Grade Level: 4–6** **Subjects: S, SS, M, LA**

This activity explores the advantages and disadvantages of the energy sources through a series of charting and graphing activities. It is an outstanding activity for developing critical thinking skills.

ENERGY SOURCE EXPO

Time: 6–7 class periods **Grade Level: 3–12** **Subjects: S, SS, LA, T**

This activity includes teacher and student instructions for preparing and presenting exhibits on the ten major sources of energy. Students work in groups to research and write short scripts and prepare hands-on exhibits to teach others about the sources of energy we use today.

ENERGY ON PUBLIC LANDS

Time: 5 class periods **Grade Level: 5–8** **Subjects: S, SS, M, LA**

Students learn and teach others about how energy resources on public lands are managed with background information and hands-on activities.

FOSSIL FUELS TO PRODUCTS

Time: 3–10 class periods **Grade Level: 7–12** **Subjects: S, SS, M**

Students learn about exploration, production, refining, chemical manufacturing, transportation, marketing, and uses of petroleum, natural gas, and their products in the industrial sector, with background information and hands-on activities.

Step Two: Sources of Energy

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

GREAT ENERGY DEBATE GAME

Time: 2 hours **Grade Level: 6–12** **Subjects: S, SS, M, LA**

Appropriate for science or social studies classes. Student groups evaluate and debate the advantages and disadvantages of the ten major energy sources used in the United States today.

GREAT ENERGY ROCK PERFORMANCES

Time: 2–4 hours **Grade Level: 4–12** **Subjects: S, SS, LA, PA**

You may choose to do the short or long version of **Great Energy Rock Performances**. In the long version, students write their own songs, introductions, and interviews. In the short version of this activity, students perform sample songs written by NEED.

H_2 EDUCATE

Time: 10 hours **Grade Level: 6–12** **Subjects: S, SS, M, LA, PA, T**

H_2 Educate develops a comprehensive understanding of hydrogen as a fuel for the future. It includes a backgrounder and hands-on experiments, with a detailed Teacher Guide and Student Guide.

HYDROPOWER

Time: 6–12 hours **Grade Level: K–12** **Subjects: S, SS, M, LA, T**

Students learn about water, energy, and the uses of hydropower as a source to generate electricity through developmentally appropriate reading materials. There is a Teacher Guide and Student Guide at each level. Students participate in hands-on investigations to help them extend their understanding that water can be used to do work, including electricity generation.

Water and Energy (K–2)

Wonders of Water (3–5)

Energy of Moving Water (6–8)

Exploring Hydroelectricity (9–12)

MARINE ENERGY

Time: 1–4 hours **Grade Level: 7–12** **Subjects: S, SS, LA**

Students conduct a community hearing on the development of energy and/or minerals in coastal areas.

NUCLEAR ENERGY *NEW*

Time: 5-10 class periods **Grade Level: 6–12** **Subjects: S, SS, LA**

Written at two different levels, NEED's new curriuclum on nuclear energy integrates science, social studies, and language arts. Student Guides present background information on energy, the history of nuclear energy, and how uranium is used to generate electricity. The Teacher Guide can be used with both levels of text. Included in the Teacher Guide are hands-on science activities and scenarios for having class to conduct a mock NRC hearing or write persuasive letters about the use of nuclear energy.

Energy From Uranium (6–8)

Exploring Nuclear Energy (9–12)

For information about NEED's hands-on kits, the NEED catalog has descriptions of equipment, cost, and ordering details. You can obtain a catalog by calling 1-800-875-5029 or downloading a copy from www.need.org.

Step Two: Sources of Energy

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

OCEAN ENERGY

Time: 5 class periods **Grade Level: 6–8** **Subjects: S, SS, LA**

Students learn and teach others about sources of energy found in and under the ocean with background information and hands-on activities.

PRIMARY ENERGY STORIES & MORE

Time: Varies by activity **Grade Level: K–3** **Subjects: S, SS, M, LA**

This booklet contains a series of stories and activities for primary teachers or upper elementary students to use to introduce basic energy concepts and the major energy sources to primary students.

SOLAR ENERGY

Time: 6 hours **Grade Level: K-12** **Subjects: S, SS, M, LA, T**

Solar Energy units are available at all four grade levels. The primary level curriculum has one Teacher Guide with background information presented in a read aloud format with corresponding activities. Units at the other levels each include a detailed Teacher Guide and Student Guide with background information and activities.

The Sun and Its Energy (K–2)

Energy From The Sun (3–5)

Exploring Solar Energy (6–8)

Photovoltaics (9–12)

THIS MINE OF MINE

Time: 45 minutes **Grade Level: 4–6** **Subjects: S, SS, M, LA**

Students learn about surface mining and reclamation by building a plot of land with resources, recovering the resources, then reclaiming the land.

WIND ENERGY

Time: 12–18 hours **Grade Level: K-12** **Subjects: S, SS, M, LA, T**

The Wind Energy curriculum includes a Teacher Guide and Student Guide at all four grade levels. The Student Guides include background information on the physics of wind, history of wind energy, and how wind is used today to generate electricity. Student Guides also include built-in science notebooks for students to record their thinking while participating in hands-on, inquiry based wind investgiations. The Teacher Guides contains a detailed sequencing of activities, Transparency Masters, and in the upper grades, specific work pages that teachers can copy and let students use in addition to their science notebooks.

Wind is Energy (K–2)

Wonders of Wind (3–5)

Energy From the Wind (6–8)

Exploring Wind Energy (9–12)

Step Three: Electricity/Magnetism

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

EXPLORING MAGNETS

Time: 3–6 hours **Grade Level: 1–4** **Subjects: S, M, LA**

Exploring Magnets introduces primary students to the basic concepts of magnetism. The guide includes instructions for each activity, Teacher Demos, Transparency Masters, and Student Worksheets for each exploration.

ELECTROWORKS

Time: 6–8 hours **Grade Level: 4–7** **Subjects: S, M, LA**

ElectroWorks introduces elementary students to the basic scientific concepts of electricity—with centers on static electricity, batteries, magnets, electrmagnetism, and circuits. The Teacher Guide includes instructions for the unit plus Transparency Masters. The Student Guide contains a backgrounder and key word worksheet as well as worksheets for each exploration and a Unit Review.

CURRENT ENERGY AFFAIR

Time: 2.5–3.5 hours **Grade Level: 7–12** **Subjects: S, SS, LA, T**

Current Energy Affair is modeled after a television news broadcast with student-correspondents reporting on seven major areas of electric power generation.

GAMES & ICEBREAKERS *IN RESOURCE PACKET*

Time: 30 minutes **Grade Level: 5–12** **Subjects: S, SS, M**

Instructions for **Electric Connections** can be found in NEED's **Games and Icebreakers** booklet. First, students rank the yearly production of electricity for the nation's top ten energy sources. In groups, students rank the top ten sources once again. Finally, students compare their rankings with the actual production figures.

MISSION POSSIBLE

Time: 3–5 hours **Grade Level: 7–12** **Subjects: S, SS, M, LA**

A cooperative learning activity in which secondary students evaluate the advantages and disadvantages of the energy sources used to generate electricity as they develop a plan to increase electricity generation for a ficticious country.

SOLAR, WIND, HYDROPOWER, HYDROGEN, NUCLEAR

Time: Varies **Grade Level: K–12** **Subjects: S, SS, M, LA, PA, T**

The solar, wind, hydropower, and hydrogen curricula include extensive inforrmation on electricity generated from renewable energy.
See descriptions of the curricula on pages 9-11.

For information about NEED's hands-on kits, the NEED catalog has descriptions of equipment, cost, and ordering details. You can obtain a catalog by calling 1-800-875-5029 or downloading a copy from www.need.org.

Step Four: Transportation

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

BIODIESEL

Time: 2–5 hours **Grade Level: 4–12** **Subjects: S, SS, M, LA, T**

Students explore biodiesel with backgrounders and activities on three reading levels.

ETHANOL

Time: 2–5 hours **Grade Level: 4–12** **Subjects: S, SS, M, LA, T**

Students explore ethanol with backgrounders and activities on three reading levels.

H_2 EDUCATE

Time: 10 hours **Grade Level: 6–12** **Subjects: S, SS, M, LA, PA, T**

The **H_2 Educate** curriculum develops a comprehensive understanding of hydrogen as a fuel for the future. It includes a backgrounder and hands-on experiments, with a detailed Teacher Guide and Student Guide.

THE FUTURE IS TODAY

Time: 2–5 hours **Grade Level: 7–12** **Subjects: S, SS, M, LA, T**

Students explore transportation fuels such as ethanol, electricity, biodiesel, compressed natural gas, and propane with an extensive backgrounder and several suggested activities. Teacher instructions are included.

TRANSPORTATION FUELS DEBATE GAME

Time: 2–5 hours **Grade Level: 6–12** **Subjects: S, SS, LA**

Students evaluate the advantages and disadvantages of conventional and alternative fuels in personal and fleet vehicles. Teacher instructions and Transparency Masters are included.

TRANSPORTATION FUELS ENIGMA

Time: 2–5 hours **Grade Level: 7–12** **Subjects: S, SS, LA**

In **Transportation Fuels Enigma**, student teams are each assigned a different fuel source. Working cooperatively, students use their reading, brainstorming, and organizational skills to hide the identity of their team's fuel while trying to guess which transportation fuels the other teams represent.

TRANSPORTATION FUELS EXPO

Time: 2–5 hours **Grade Level: 4–12** **Subjects: S, SS, LA, T**

Students work in groups to develop exhibits and make presentations on conventional and alternative transportation fuels. Teacher and student instructions are included.

TRANSPORTATION FUELS ROCK PERFORMANCES

Time: 2–5 hours **Grade Level: 4–12** **Subjects: S, SS, LA, PA**

Student rock bands write songs and sing about transportation fuels in this entertaining activity. Audiences learn more from these energy rock stars as they tell their stories to interviewers out to get the latest scoops. Teacher and student instructions are included, along with sample songs and interviews.

WHAT CAR WILL YOU DRIVE?

Time: 2–5 hours **Grade Level: 4–6** **Subjects: S, SS, M, LA, T**

Intermediate students explore the basics of transportation fuels such as ethanol, electricity, biodiesel, compressed natural gas, and propane with backgrounders and several suggested activities. Teacher instructions are included.

Step Five: Efficiency/Conservation

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

ENERGY MANAGEMENT

Time: 5 class periods, ongoing **Grade Level: K-12** **Subjects: S, SS, M, LA, T**

NEED's Energy Management curriculum provides students with the fundamentals of energy use, conservation, and the science behind it all. A Teacher Guide with detailed instructions and Transparency Masters and a Student Guide with background reading and work pages are available at all levels.

Building Buddies (2-3)

Monitoring and Mentoring (4-6)

Learning & Conserving (7-12)

CLIMATE CHANGE *COMING IN 2010*

Time: 5-10 class periods **Grade Level: K-12** **Subjects: S, SS, M, LA, T**

With four separate books for primary, elementary, intermediate and secondary, our new climate change curriculum addresses current concerns about climate. Students will understand why humans use the sources they do, and how their use is impacting the world. Students will reflect on their daily habits and decide what steps they can take to lessen their carbon footprint.

Climate Change Flipbook (K–2)

Climate Change and Energy (3–5)

Understanding Climate Change (6–8)

Exploring Climate Change (9–12)

ENERGY CONSERVATION CONTRACT

Time: 1.5–2.5 hours **Grade Level: 4–12** **Subjects: S, M, LA, T**

Each student surveys his/her family's energy behaviors. After one month, students survey their families once again and tabulate their energy savings. Can be extended to neighbors and friends.

ENERGY HOUSE

Time: 1.5–2.5 hours **Grade Level: 4–8** **Subjects: S, SS, M, T**

Students work in groups to insulate cardboard houses using caulking, weatherstripping, and insulating materials. Teacher and student instructions are included.

GAMES & ICEBREAKERS *IN RESOURCE PACKET*

Time: 1.5–2.5 hours **Grade Level: 5–12** **Subjects: S, SS, LA, PA**

Instructions for **This Week in Energy Conservation** can be found in the **Games and Icebreakers** booklet. Students are organized into groups; each group writes and performs a news brief or public service announcement on a specific area of energy efficiency.

SAVING ENERGY AT HOME AND SCHOOL

Time: 5 class periods, ongoing **Grade Level: 4-8** **Subjects: S, SS, M, LA, T**

Saving Energy at Home and School focuses on residential energy use and conservation. Students learn how to assess energy usage (lighting, insulation, weatherization, electricity use, and water heating) in the classroom and school. Students then take their learning home and work with their families on assesing home energy use and implementing energy saving measures.

Step Five: Efficiency/Conservation

EFFICIENCY CONSERVATION

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

SAVING ENERGY EXPO

Time: 6–7 class periods **Grade Level: 4–12** **Subjects: S, SS, LA, T**

This activity includes teacher and student instructions for preparing and presenting exhibits on ways to save energy. Students work in groups to research, write short scripts and prepare hands-on exhibits to teach others about ways to save energy at home and school.

SAVING ENERGY FLIPBOOK

Time: varies **Grade Level: K–1** **Subjects: S, SS, M, LA**

Saving Energy Flipbook introduces students to the concepts of energy use and conservation in a flipbook format with suggested activities included.

SCHOOL ENERGY SURVEY

Time: varies **Grade Level: 9–12** **Subjects:, S, M, T**

These energy audit activities teach secondary students about building science and energy management as they use the data collection tools in the **Learning & Conserving Kit** to complete more comprehensive energy audits of their school and make recommendations for change.

TODAY IN ENERGY

Time: 1–2 hours **Grade Level: 1–4** **Subjects: S, SS, M, LA**

Appropriate for primary classes with reading skills. Students use cards describing energy-using activities to make choices about their energy use throughout the day.

SOLID WASTE AND ENERGY

Time: 4-6 hours **Grade Level: K-12** **Subjects: S, SS, M, LA, T**

At the primary level students learn the basics of trash and what happens to it through a non-fiction read aloud and hands-on activities. At the other levels students work in small groups and learn about waste generated in the U.S., recycling, landfilling, and turning waste into energy. Students present exhibits to teach others about trash and its energy implications.

Trash Flipbook (Primary)

Talking Trash (Elementary)

Museum of Solid Waste and Energy (Intermediate and Secondary)

For information about NEED's hands-on kits, the NEED catalog has descriptions of equipment, cost, and ordering details. You can obtain a catalog by calling 1-800-875-5029 or downloading a copy from www.need.org.

Step Six: Synthesis/Reinforcement

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

ENERGY ANALYSIS

Time: 2–5 hours **Grade Level: 7–12** **Subjects: S, SS, M, T**

This activity for secondary students emphasizes research and graph analysis skills to discern energy trends using the Energy Information Administration's ***Energy Perspectives*** publication. Introductory data is included for students to graph and analyze.

ENERGY AROUND THE WORLD

Time: 1.5–2.5 hours **Grade Level: 5–12** **Subjects: S, SS, M, LA, T**

Students make presentations on energy resources and consumption in other countries.

ENERGY CARNIVALS

Time: 2–4 hours **Grade Levels: K–12** **Subjects: S, SS, M, LA**

Students combine math, spelling, history, and science knowledge with carnival game skills in this fun activity. Each carnival game has questions or problems for different age levels. The **Primary Energy Carnival** contains nine games designed to reinforce information about the energy sources, renewable and nonrenewable energy, and the things energy does for us.

ENERGY FAIR—EXPERIMENTAL DESIGN

Time: 2 hours **Grade Level: 1–5** **Subjects: S, LA**

Activities that teach students experimental design with suggestions for science projects focusing on energy.

ENERGY JEOPARDY

Time: 1.5 hours **Grade Level: 4–12** **Subjects: S, SS, M, LA**

Students work in teams to determine questions for the answers in various energy categories, including efficiency and transportation.

ENERGY MATH CHALLENGE

Time: 1.5–2.0 hours **Grade Level: 3–12** **Subjects: S, SS, M, LA**

Students work as individuals and in teams to solve energy math problems.

ENERGY ON STAGE

Time: 1–5 hours **Grade Level: 4–12** **Subjects: S, SS, LA, PA**

The best of NEED's energy plays are included for students to prepare and present to others.

EXPLORING ENERGY

Time: Varies with activity **Grade Level: 4–6** **Subjects: S, SS, M, LA**

This booklet contains short articles and hands-on activities on a variety of energy-related topics such as composting, solar cooking, microwaves, and the greenhouse effect.

GAMES & ICEBREAKERS *IN RESOURCE PACKET*

Time: varies with activity **Grade Level: K–12** **Subjects: S, SS, M, LA, PA**

This booklet contains activities that reinforce many energy concepts, including Energy Chants, Energy Wasters, Energy BINGO, Energy Match Game, and more.

Step Six: Synthesis/Reinforcement

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

GLOBAL TRADING GAME

Time: 2 hours **Grade Level: 4–12** **Subjects: S, SS, M, LA**

A hands-on activity in which students assume the roles of geologists, miners, and international traders as they learn about global energy issues and supply and demand.

GREEK MYTHOLOGY & FORMS OF ENERGY

Time: 6 hours **Grade Level: 4–8** **Subjects: S, SS, LA**

A multi-disciplinary unit that incorporates Greek mythology and forms of energy.

MYSTERY WORLD TOUR

Time: 3 hours **Grade Level: 4–8** **Subjects: S, SS, M, LA**

Students learn about the cultures and resources of different countries in this hands-on activity.

NEED SONGBOOK

Time: varies **Grade Level: All** **Subjects: S, SS, PA**

Energy songs with music to reinforce energy concepts and add a little fun.

PROJECTS & ACTIVITIES *IN RESOURCE PACKET*

Time: varies with activity **Grade Level: K–12** **Subjects: S, SS, M, LA, PA**

Classroom and outreach activities that extend energy knowledge into the family and community—including **Electric Puzzles**, writing an energy newspaper, creating energy tips, and burying an energy time capsule. Includes the **Youth Awards Guide**.

YESTERDAY IN ENERGY

Time: 1–4 hours **Grade Level: 4–12** **Subjects: S, SS, LA, PA**

Students research and make presentations on energy use in the past.

Step Seven: Evaluation

ENERGY POLLS

Evaluation and assessment are important components of any energy unit and should be ongoing. NEED offers many assessment and evaluation tools for teachers to use.

Use one of the NEED **Energy Polls** prior to beginning the unit. There are polls on four reading levels—primary, elementary, intermediate, and secondary. The polls are found in this booklet, beginning on page 22, as well as on the NEED website, www.need.org. We recommend that you use the web-based polls if you have internet capability; the results will be tabulated for you, and you can compare pre- and post-polls for your students. Many NEED activities also contain unit exams and suggestions for how to evaluate students' performance. Please feel free to modify these suggestions as necessary. For more information about the online polls, e-mail NEED at info@need.org. If you choose to use the paper version, please forward your results to the NEED Project at P.O. Box 10101; Manassas, VA 20108.

QUESTION BANK

The Question Bank was developed by NEED's Teacher Advisory Board to give teachers a tool for designing their own assessments. Whether you want to add one or two questions to an assessment you already use, or you want to develop a customized evaluation tool for your energy unit, questions with answers are available to download at www.need.org.

Questions are written at four grade levels: primary, elementary, intermediate, and secondary. At each grade level, the questions are divided into the following topics: Science of Energy & Forms of Energy, Sources of Energy, Electricity, Transportation, and Conservation and Efficiency. Under each topic, Knowledge, Comprehension and Application questions are included. All files are the MS Word(doc) file format.

FEEDBACK

We'd like to hear your comments and suggestions about your energy education unit. Please let us know what worked well and what needs improvement. Please complete the Evaluation Form on page 35 of this booklet, as well as the individual evaluation forms at the back of each activity, and send them to us at The NEED Project; P.O. Box 10101; Manassas, VA 20108.

Step Eight: Recognition

YOUTH AWARDS PROGRAM FOR ENERGY ACHIEVEMENT

NEED encourages all schools to participate in the Youth Awards Program for Energy Achievement by having their students keep a scrapbook of their activities to submit to NEED by April 15, 2010. Information about the Youth Awards Program is included in the **Projects and Activities** booklet in your NEED Membership packet. Summaries of winning projects by schools nationwide can be found in NEED's **Annual Report**. Many new activities and school programs are also highlighted in the **Energy Exchange** newsletter, which is sent to all NEED members five times a year. For more information about the Youth Awards Program, go to www.need.org/awards.htm.

ENERGY FAIR

The **Energy Fair** booklet teaches students experimental design and provides suggestions for energy-related science fair projects. An energy fair is a good way to recognize student achievement by exhibiting projects they have completed.

Energy Poll Guide

GRADES: 1–12 (FOUR READING LEVELS AVAILABLE)
PREPARATION: LOW
TIME: 20 MINUTES

A QUICK LOOK AT THE ENERGY POLLS

The **Energy Polls** can be used to assess students' basic energy knowledge, as well as their opinions about energy before and after your classroom energy unit. There are polls on four reading levels—**Primary**, **Elementary**, **Intermediate,** and **Secondary**.

The polls are also available on the NEED website, **www.need.org**, where the results will be compiled for you. NEED requests that everyone who has the computer capability use the web-based polls. The polls are designed as a valuable evaluation tool for the NEED program, as well as for your classroom. Call 1-800-875-5029 or email NEED at info@need.org if you have questions about the web-based polls.

PREPARATION IF NOT USING WEB-BASED POLLS

Choose the applicable poll for the reading level of your class. Make one copy of the poll for each student. If you prefer, you can make one transparency of the poll and have the students answer the questions on a piece of paper. In either case, keep the results of the pre-poll so that students can compare their answers after your energy unit.

PROCEDURE

Direct the students to take the poll as honestly as possible and not to make wild guesses. Explain that the poll will be an important assessment tool to show what they have learned and how their attitudes have changed.

Once you have administered the poll, go over the answers with the students. As a supplemental activity, discuss and chart the answers to the opinion questions. Collect the answers and save them to use after your energy unit is completed.

Energy Poll Answer Keys

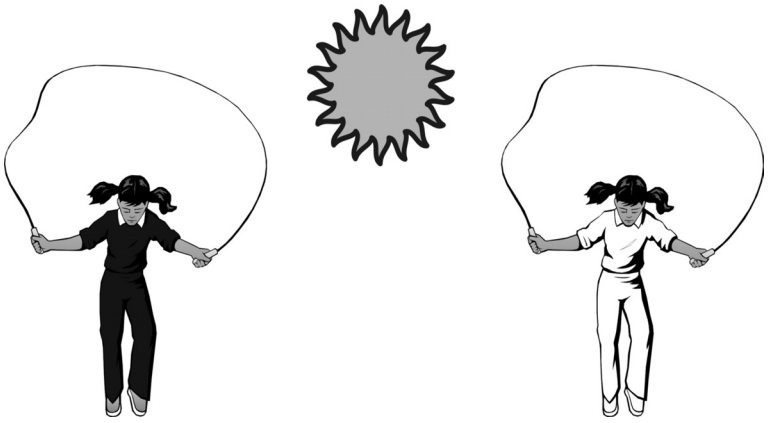
POLL ANSWERS

PRIMARY	ELEMENTARY	INTERMEDIATE	SECONDARY
1. Child in black	1. d	1. d	1. a
2. 1-sun 2-wheat 3-bread 4-girl	2. c	2. b	2. c
3. Boy on left	3. b	3. d	3. c
4. Paperclip	4. d	4. c	4. b
5. c	5. a	5. d	5. a
6. b	6. a	6. b	6. b
7. a	7. d	7. a	7. d
8. a	8. d	8. d	8. c
9. a	9. b	9. b	9. c
10. c	10. b	10. a	10. d
11. c	11. a	11. c	11. b
12. c	12. c	12. d	12. d
13. c	13. b	13. b	13. b
14. b	14. c	14. c	14. a
	15. c	15. c	15. b
	16. b	16. d	16. b
	17. a	17. c	17. c
	18. d	18. c	18. d
	19. b	19. d	19. c
	20. b	20. a	20. d

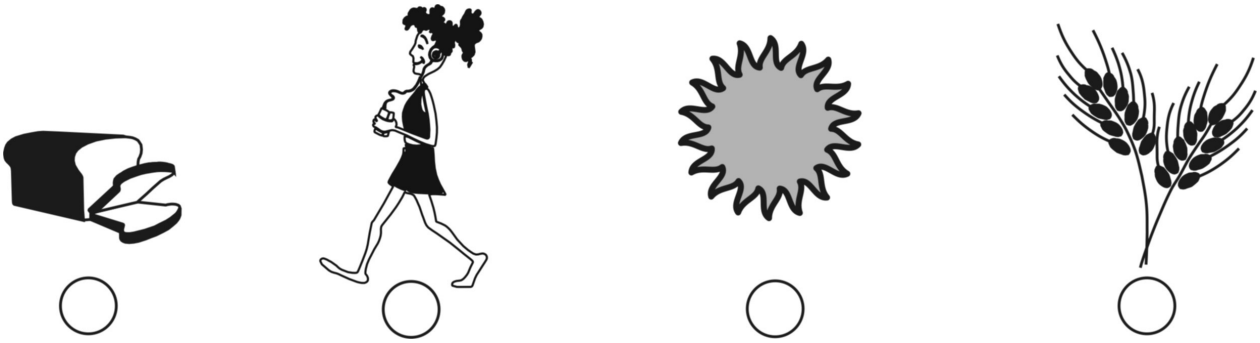
Primary Poll

SCIENCE OF ENERGY

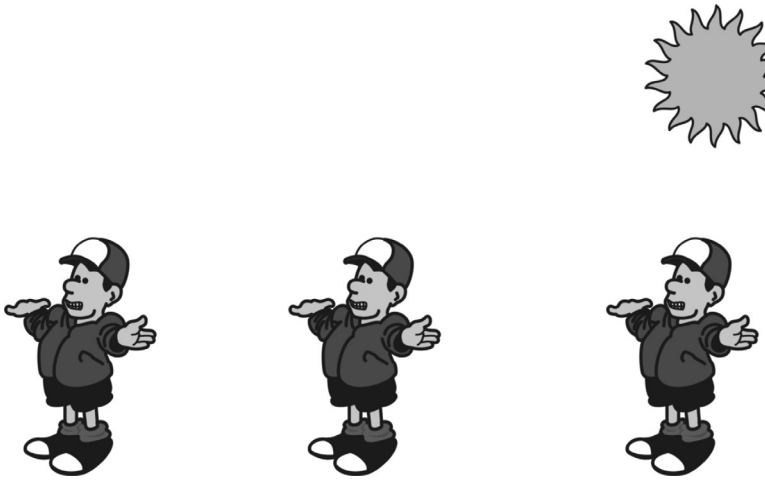
1. **Circle the child who would feel hotter.**



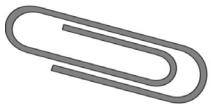
2. **In the circles, number the pictures from 1 to 4 to show the flow of energy through the food chain.**

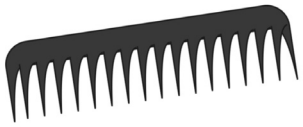


3. **Circle the boy who would have the longest shadow.**



4. Circle the object that a magnet would attract.





SOURCES OF ENERGY

5. Which energy source is renewable?
a. coal b. propane c. solar

6. Which energy source is a fossil fuel?
a. wind b. coal c. biomass

7. Which energy source provides gasoline for cars?
a. petroleum b. propane c. natural gas

8. Which energy source depends on the water cycle?
a. hydropower b. solar c. wind

9. Which energy source comes from deep inside the earth?
a. geothermal b. hydropower c. biomass

10. Which energy source makes the most electricity?
a. propane b. petroleum c. coal

ELECTRICITY

11. What is electricity?
a. moving atoms b. moving wires c. moving electrons

12. When you turn on a TV, which shows that electricity is being used?
a. the picture b. the sound c. both the picture and the sound

SAVING ENERGY

13. Which is a way to save electricity?

a. leave the lights on when you leave the room for just a few minutes
b. open the windows when you turn on the air conditioning
c. use a fan instead of air-conditioning to cool your house

14. Which way will save the most fuel?

a. ride the school bus
b. walk to school
c. have your mom drive you to school

OPINION

Tell us if you agree with these statements. Check the box under your answer.

	NO I DON'T AGREE	I AGREE SOME	YES I AGREE
1. There are things I can do to save energy	☐	☐	☐
2. Learning about energy is fun	☐	☐	☐
3. I know a lot about energy	☐	☐	☐
4. I like to do activities about energy	☐	☐	☐

LEADERSHIP

How much do you like doing these school activities? Check the box under your answer.

	I DON'T LIKE TO	I LIKE TO SOME	I LIKE TO A LOT
1. Work in a group	☐	☐	☐
2. Follow directions	☐	☐	☐
3. Help others in my group	☐	☐	☐
4. Listen to my teacher	☐	☐	☐
5. Help with classroom activities	☐	☐	☐

Elementary Poll

SCIENCE OF ENERGY

1. **Energy is needed to do which of the following?**
   a. make things move
   b. make things grow
   c. make heat and light
   d. all of the above

---

2. **Newton's Law of Motion states that an object in motion stays in motion unless a force changes its motion. If you kick a ball, what force makes the ball stop?**
   a. gravity
   b. friction
   c. both gravity and friction
   d. neither gravity nor friction

---

3. **Why do most apples appear red to us?**
   a. Red apples absorb the color red and reflect other colors.
   b. Red apples reflect the color red and absorb the other colors.
   c. Red apples reflect ultraviolet radiation.
   d. Red apples absorb infrared radiation.

---

4. **Which of the following increases friction?**
   a. freezing rain on a road
   b. wax on skis
   c. air blowing up on an air hockey table
   d. rubber soles on shoes

---

5. **When you turn on a lamp, the electricity changes into what forms of energy?**
   a. heat and light
   b. sound and light
   c. electrical and light
   d. heat and electrical

---

6. **When you place a metal spoon in a pot of boiling water, the handle of the spoon becomes very hot even though it isn't touching the water. What kind of heat transfer is taking place?**
   a. conduction
   b. convection
   c. radiation
   d. all of the above

---

7. Why are some energy sources called renewable?
a. They are clean and free to use.
b. They take a long time to be remade by nature.
c. They do not produce pollution.
d. They can be remade by nature in a short time.

---

8. In the United States, which energy source produces most of our electricity?
a. solar
b. natural gas
c. petroleum
d. coal

---

9. Which energy source provides most of our transportation needs?
a. solar
b. petroleum
c. biomass
d. coal

---

10. Which energy source means heat from inside the earth?
a. hydropower
b. geothermal
c. coal
d. natural gas

---

11. Which energy source is made by the uneven heating of the earth's surface?
a. wind
b. hydropower
c. geothermal
d. solar

---

12. Which energy source is used in nuclear power plants?
a. petroleum
b. propane
c. uranium
d. biomass

---

13. Electricity travels in closed loops called...

a. transformers
b. circuits
c. shells
d. generators

---

14. Electricity is the movement of...

a. neutrons
b. protons
c. electrons
d. molecules

---

15. How is the amount of electricity you use at home measured?

a. ampere
b. volt
c. kilowatt-hour
d. watt

---

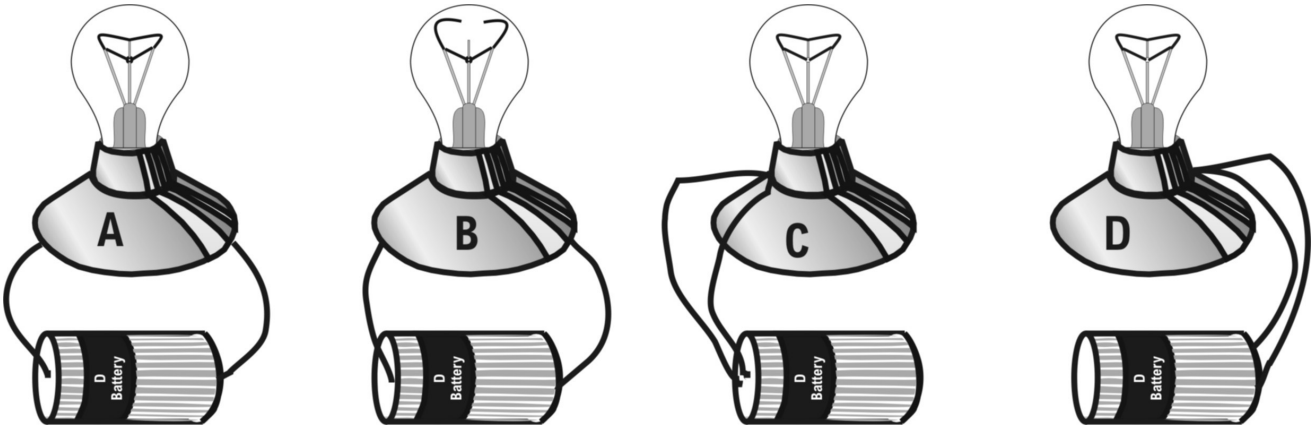
16. Generators have which of the following parts?

a. magnets and transformers
b. magnets and coils of copper wire
c. transformers and coils of copper wire
d. transformers and reactors

---

17. In which picture will the lightbulb light?

a. A
b. B
c. C
d. D



18. Which task in the average home uses the most energy?

a. lighting
b. keeping food cold
c. washing and drying clothes
d. heating and cooling the rooms

---

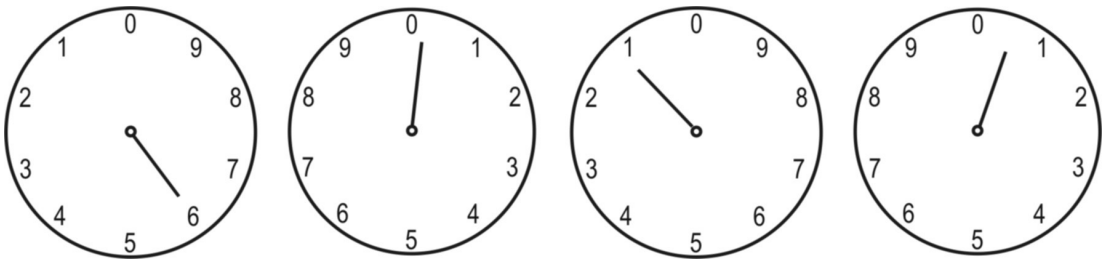
19. Which type of lightbulb is the most energy efficient?

a. incandescent
b. compact fluorescent
c. halogen
d. all lightbulbs are the same

---

20. What is the reading on the natural gas meter dials pictured below?

a. 7011 ccf
b. 6010 ccf
c. 6111 ccf
d. 6000 ccf



OPINION

Circle the number that represents how strongly you agree or disagree with the statement.

	Strongly Disagree				Strongly Agree
1. There are lots of ways to save energy	**1**	**2**	**3**	**4**	**5**
2. Learning about energy can be fun	**1**	**2**	**3**	**4**	**5**
3. I want to learn more about energy	**1**	**2**	**3**	**4**	**5**
4. Energy is important for our future	**1**	**2**	**3**	**4**	**5**
5. It's best to use a mix of energy sources	**1**	**2**	**3**	**4**	**5**

LEADERSHIP

Below are some activities you may do at school. Circle the number that represents how comfortable you are doing them.

	Not Comfortable				Very Comfortable
1. Talking in front of students in my class	**1**	**2**	**3**	**4**	**5**
2. Making a presentation to teachers	**1**	**2**	**3**	**4**	**5**
3. Planning an activity with other students	**1**	**2**	**3**	**4**	**5**
4. Showing other students how to do an activity	**1**	**2**	**3**	**4**	**5**
5. Expressing my ideas to other students	**1**	**2**	**3**	**4**	**5**

Intermediate Poll

SCIENCE OF ENERGY

1. When you turn on a television, the electricity changes into which form(s) of energy

a. sound b. light c. heat d. a, b, and c

2. An increase in the motion of molecules indicates an increase in which form of energy?

a. radiant b. thermal c. chemical d. electrical

3. The human body uses the chemical energy in food to produce which form(s) of energy?

a. mechanical b. chemical c. thermal d. a, b, and c

4. All natural energy transformations can be traced back to which form of energy?

a. mechanical b. chemical c. nuclear d. a, b, and c

5. Electrical energy can be produced from which form(s) of energy?

a. mechanical b. chemical c. radiant d. a, b, and c

6. Molecules are farthest apart in which state of matter?

a. solid b. gas c. liquid d. fluid

SOURCES OF ENERGY

7. Which of the following is NOT a fossil fuel?

a. uranium b. petroleum c. natural gas d. coal

8. In the United States, we rely mainly on which source of energy for electricity?

a. hydropower b. natural gas c. petroleum d. coal

9. Renewable energy sources provide what percentage of total U.S. energy consumption?

a. less than 1% b. 5-10% c. 20-25% d. 30-35%

10. Which energy source is NOT a result of solar energy?

a. uranium b. wind c. hydropower d. biomass

11. Which energy source provides most of our transportation needs?

a. electricity b. natural gas c. petroleum d. coal

12. Which energy source is produced by uneven heating of the earth's surface?

a. hydropower b. biomass c. geothermal d. wind

ELECTRICITY

13. If a carbon atom with six protons is in balance, how many electrons are in its shells?

a. 8 b. 6 c. 12 d. 4

14. A transformer changes which measure of electricity?

a. wattage b. amperage c. voltage d. circuitry

15. What do most power plants use to produce electricity?

a. photovoltaics b. transformers c. turbine generators d. batteries

16. Which of the circuits pictured below will produce an electric current?

a. Diagram 1 b. Diagram 2 c. Diagram 3 d. Diagrams 2 & 3

Diagram 1

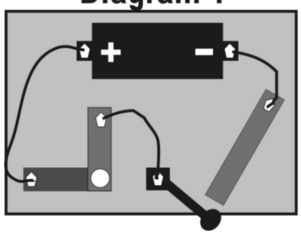


Diagram 2

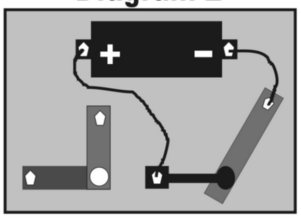
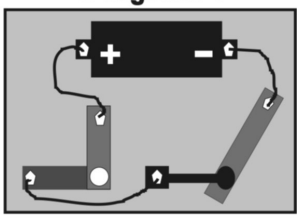


Diagram 3



CONSERVATION/EFFICIENCY

17. An incandescent bulb converts 10% of the energy it uses into light and 90% into which form of energy?

a. radiant b. potential c. thermal d. chemical

18. Looking at the meters below, how much energy was used in January?

a. 11,155 kWh b. 11.55 kWh c. 1,155 kWh d. 43,185 kWh

On January 1, the electric meter looked like this:

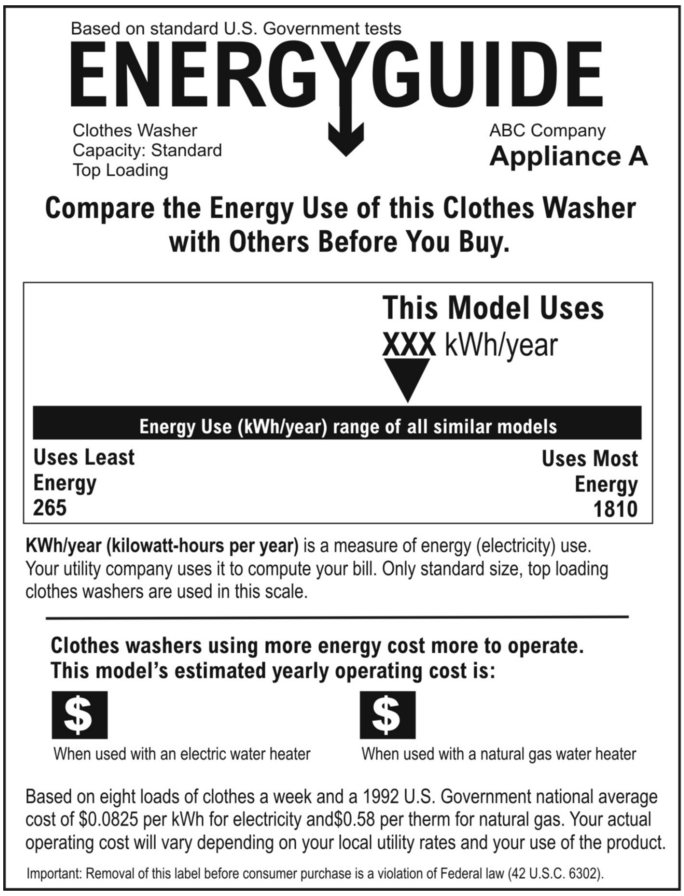
On January 31, the electric meter looked like this:

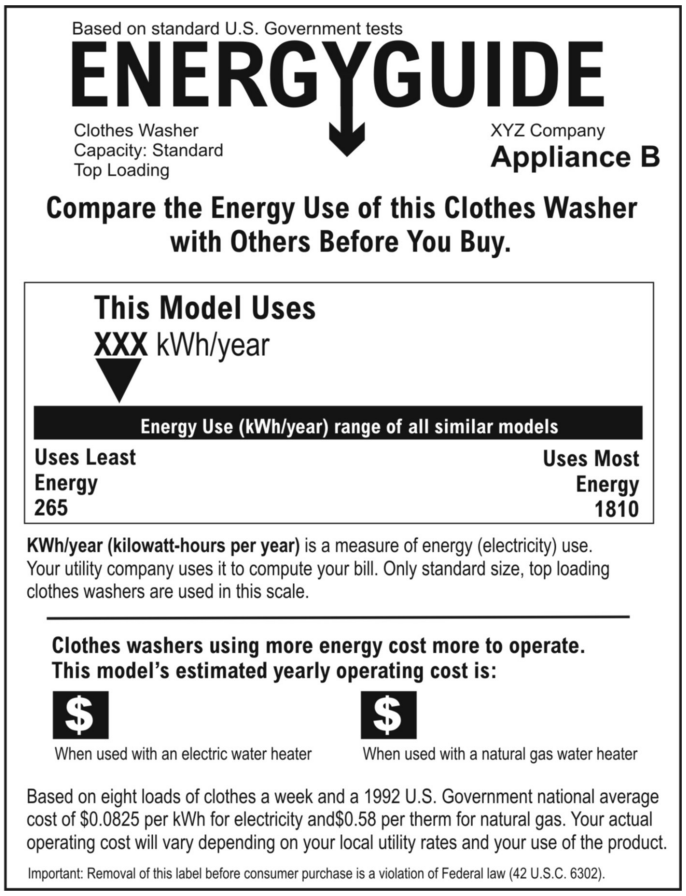
19. Which task in a typical home uses the most energy?

a. operating appliances
b. heating water
c. refrigerating food
d. heating and cooling rooms

20. Look at the EnergyGuide labels below. Which is the correct statement?

a. Appliance A uses more energy than Appliance B.
b. Appliance A uses less energy than Appliance B.
c. Appliance A uses more water than Appliance B.
d. Appliance A uses less water than Appliance B.





OPINION

Circle the number that represents your opinion of the statement.

	Strongly Disagree				Strongly Agree
1. There are a lot of ways to save energy	**1**	**2**	**3**	**4**	**5**
2. I'd consider a career that involves energy	**1**	**2**	**3**	**4**	**5**
3. Learning about energy can be fun	**1**	**2**	**3**	**4**	**5**
4. I know a lot about energy	**1**	**2**	**3**	**4**	**5**
5. Energy is important to our lifestyle	**1**	**2**	**3**	**4**	**5**
6. I want to learn more about how to save energy	**1**	**2**	**3**	**4**	**5**
7. Learning about energy is important	**1**	**2**	**3**	**4**	**5**
8. It's best to use a mix of energy sources	**1**	**2**	**3**	**4**	**5**

LEADERSHIP

Below are some activities you may do at school. Circle the number that represents how comfortable you are doing them.

	Not Comfortable				Very Comfortable
1. Organizing students to conduct a school activity	**1**	**2**	**3**	**4**	**5**
2. Making a presentation to students in your class	**1**	**2**	**3**	**4**	**5**
3. Making a presentation to teachers at your school	**1**	**2**	**3**	**4**	**5**
4. Making a presentation to people in the community	**1**	**2**	**3**	**4**	**5**
5. Planning a lesson for other students	**1**	**2**	**3**	**4**	**5**
6. Leading a discussion on a topic such as energy	**1**	**2**	**3**	**4**	**5**
7. Teaching other students to conduct a learning activity	**1**	**2**	**3**	**4**	**5**
8. Clearly communicating your ideas to other students	**1**	**2**	**3**	**4**	**5**

Secondary Poll

SCIENCE OF ENERGY

1. What is the nuclear reaction that takes place inside the sun's core?

a. fusion b. activation c. fission d. none of the three

2. Most of the energy consumed in the U.S. is stored in which form of energy?

a. kinetic b. thermal c. chemical d. mechanical

3. Which form of energy is converted to chemical energy during photosynthesis?

a. chemical b. electrical c. radiant d. thermal

4. Which type of chemical reaction absorbs thermal energy?

a. activation b. endothermic c. exothermic d. fusion

5. As the thermal energy in a substance increases ...

a. molecular motion increases
b. molecular motion decreases
c. mass increases
d. mass decreases

SOURCES OF ENERGY

6. Photosynthesis produces the energy in which of the following sources?

a. hydropower b. biomass c. geothermal d. wind

7. Which sector of the U.S. economy consumes the most petroleum?

a. residential b. commercial c. industrial d. transportation

8. Global climate change focuses on an increase in which atmospheric gas?

a. ozone b. sulfur dioxide c. carbon dioxide d. nitrous oxide

9. Which two elements are present in all fossil fuels?

a. nitrogen and hydrogen
b. carbon and oxygen
c. hydrogen and carbon
d. carbon and nitrogen

10. The energy in which of the following is a result of photosynthesis?

a. coal b. petroleum c. natural gas d. a, b, and c

11. Renewable energy sources provide what percentage of total U.S. energy consumption?

a. 1% b. 5-10% c. 15-20% d. 25-30%

12. Which energy source is NOT a result of solar energy?

a. hydropower b. biomass c. wind d. geothermal

ELECTRICITY

13. Half of U.S. electricity is produced by which energy source?

a. hydropower b. coal c. uranium d. wind

14. Why is alternating current used instead of direct current in a power system?

a. It can be transported longer distances economically.

b. It is cheaper to produce.

c. It has more power per kilowatt-hour.

d. It is safer to use.

15. In the core of a nuclear reactor...

a. uranium atoms combine and give off heat.

b. uranium atoms are split apart and give off heat.

c. uranium atoms are burned and give off heat.

d. uranium isotopes are burned and give off heat.

16. What does it mean if a power plant is 35% efficient?

a. For every 100 units of energy going into a plant, 35 units are lost during energy transformations.

b. For every 100 units of energy that go into the plant, 35 units are converted into usable energy.

c. For every 35 units of energy that go into the plant, 100 units are produced.

d. For every $100 invested in the production of energy, $35 is made in profit.

EFFICIENCY/CONSERVATION

17. In the summer, when is the peak energy demand?

a. 12:00 to 6:00 am b. 6:00 am to noon c. noon to 6:00 pm d. 6:00 pm to 12:00 am

18. The shorter the payback period of an energy-efficient appliance...

a. the more energy you save.

b. the less energy you save.

c. the longer you need to use the appliance to save money.

d. the sooner you start to save money.

19. An incandescent bulb converts 10% of the energy it uses into light and 90% into which form of energy?

a. radiant b. potential c. thermal d. chemical

20. What device can control the indoor temperature of a home according to time of day?

a. boiler b. ventilator c. thermometer d. programmable thermostat

OPINION

Circle the number that represents your opinion of the statement.

	Strongly Disagree				Strongly Agree
1. There are a lot of ways to save energy	1	2	3	4	5
2. I'd consider a career that involves energy	1	2	3	4	5
3. Learning about energy can be interesting	1	2	3	4	5
4. I know a lot about energy	1	2	3	4	5
5. Energy is essential to our country's economy	1	2	3	4	5
6. I want to learn more about how to save energy	1	2	3	4	5
7. Learning about energy is important	1	2	3	4	5
8. Energy is a complex topic	1	2	3	4	5
9. It's best to use a mix of energy sources	1	2	3	4	5
10. I know how to find information about energy issues	1	2	3	4	5

LEADERSHIP

Below are some activities you may do at school. Circle the number that represents how comfortable you are doing them.

	Not Comfortable				Very Comfortable
1. Organizing students to conduct a school activity	1	2	3	4	5
2. Making a presentation to students in your class	1	2	3	4	5
3. Making a presentation to teachers at your school	1	2	3	4	5
4. Making a presentation to people in the community	1	2	3	4	5
5. Planning a lesson for other students	1	2	3	4	5
6. Leading a discussion on a topic such as energy	1	2	3	4	5
7. Teaching other students to conduct a learning activity	1	2	3	4	5
8. Clearly communicating your ideas to other students	1	2	3	4	5

NEED Program
Evaluation Form

State: _____ **Grade Level: _____** **Number of Students: _____**

1. **Have you attended a NEED conference or workshop?** **Yes** **No**
   If Yes, which one? _____
2. **Did you use the Blueprint to plan your energy unit?** **Yes** **No**
3. **How much time was devoted to your energy unit?**

4. **What topics did you cover in your energy unit? What NEED curriculum pieces did you use?**

7. **Did you use materials from www.need.org, or did you order printed copies?**

8. **Did you have students use the worksheets provided in the materials? If not, what did you use to have students record their thinking?**

9. **Would you describe your unit as successful? Why or why not?**

10. **How would you rate the program overall?**

11. **What would make the program more useful to you?**

Please return to The NEED Project
PO Box 10101
Manassas, VA 20108
FAX: 1-800-847-1820

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